# Steller sea lion *(Eumetopias jubatus)* pups are more hydrated than adults

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## Introduction

Blood chemistry may be used to evaluate the health of Steller sea lions [1]. However, hydration has not been as thoroughly explored, and may also be valuable to health assessment.

**Primary research question:** Do Steller sea lion pups differ in hydration compared to adults?

**Prediction:** Steller sea lion pups will be more hydrated than adults, due to their liquid diet and greater body fat content [2].

**Secondary research question:** Do male and female pups differ in hydration due to unequal maternal investment between sexes?

Figure 1. A Steller sea lion pup. Photo: Lorrie Rea

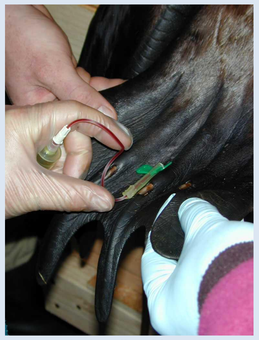

Figure 2. Blood is collected from a Steller sea lion. Photo: Lorrie Rea

## Methods

**Initial Collection**

- Blood samples were drawn in the field from the caudal gluteal vein and taken to the laboratory ≤4 hours later.
- Samples were centrifuged, and the plasma removed and frozen.

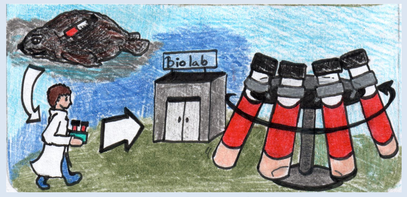


Figure 3. Samples were collected and centrifuged. Illustration: Lindsey Klueber

**Sample Preparation**

- 500µL of thawed plasma were mixed with a vertex, placed in a culture tube, and weighed.
- Samples were placed in a drying oven at 38°C for three days.

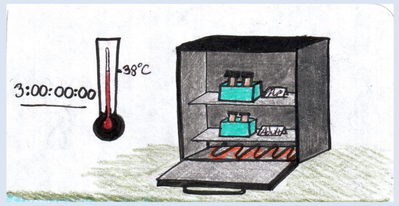


Figure 4. Samples were dried in an oven at 38°C for three days. Illustration: Lindsey Klueber

**Final Measurements**

- Samples were re-weighed after three days in the drying oven.
- Hydration was calculated as percent water lost (percent difference in mass).

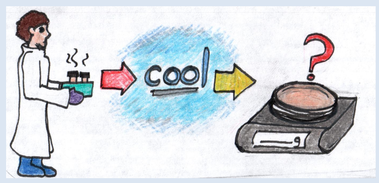


Figure 4. Samples were cooled and weighed. Illustration: Lindsey Klueber

## Results

Steller sea lion pups are more hydrated than adults.

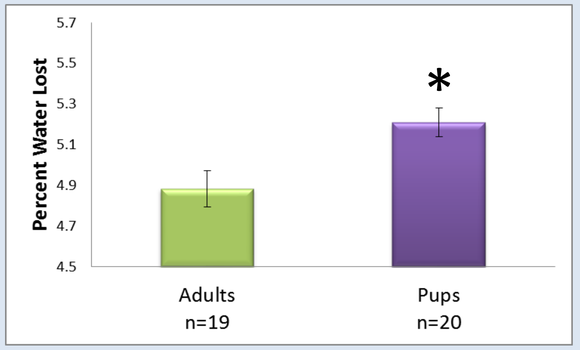


Figure 6. Hydration (percent water lost) of blood plasma was greater in Steller sea lion pups versus adults. (Two-sample t-test, unequal variances: df=8, t-stat=2.54, *p=0.006)

No detectable difference in hydration between male and female pups.

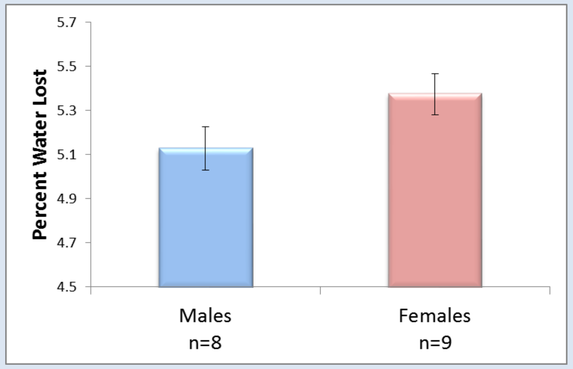


Figure 7. Hydration (percent water lost) of blood plasma was similar between male and female Steller sea lion pups. (Sex was known for only 17 of the 20 pup samples.) (Two-sample t-test, unequal variances: df=15, t-stat=-1.81, p=0.090)

## Conclusions

- Our finding that pups are more hydrated than adults is important to health assessment of Steller sea lions.
- Although no statistically significant difference was found between male and female pups, our limited sample size warrants further research. Our result is consistent with research in other marine mammals that indicates equal maternal investment regardless of sex [3].
- Future studies could measure hydration levels among different locations as a means of monitoring health and environmental stressors.

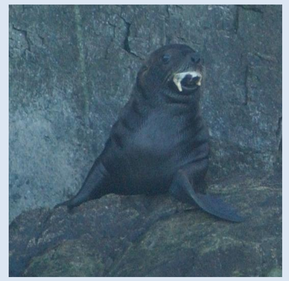

Figure 8. A Steller sea lion pup after feeding. Photo: Lorrie Rea

## Literature Cited

1. Rea, L. D., M. A. Castellini, B. S. Fadely, T. R. Loughlin. Health status of young Alaska Steller sea lion pups *(Eumetopias jubatus)* as indicated by blood chemistry and hematology. 1998. Comparative Biochemistry and Physiology Part A 120:617-623.
2. Richmond, J.P., J.M. Burns, and L.D. Rea. Ontogeny of total body oxygen stores and aerobic dive potential in Steller Sea Lions (*Eumetopias jubatus*). 2006. J Comp Physiol B 176:535-545.
3. Smiseth, P. T., and S.H. Lorentsen. Evidence of equal maternal investment in the sexes in the polygynous and sexually dimorphic grey seal *(Haliochoerus grypus)*. 1995. Behavioral Ecology and Sociobiology 36:145-150.

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